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ABSTRACT

The need of the professions to update is studied. It is pointed out that the half-life in a professional's competence is the point in time after the completion of training when he had become roughly half as competent as he was upon graduation. Obsolescence is defined as a reduction of efficiencies of performance over time. It has been found to exist when there is a discrepancy between job needs and managerial or professional capabilities as a result of innovation. It is stated that the motivational process at the adult and professional level is a major undeveloped area and one which continuing education should explore. Various methods of assessing competence include: testing, questionnaires, interviews. Research in continuing education has been found to be light in both quantity and quality. Continuing education approaches are studied in the following fields: medicine, natural resources, education, psychology, law, biological science, dentistry, management, engineering.
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NEW DEVELOPMENTS IN CONTINUING EDUCATION FOR THE PROFESSIONS

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One of the most striking developments in continuing education today is that the professions themselves are recognizing that they need to update in order to survive. For example, a new awareness of the need for continuing education has been heightened in the medical profession by the pressure from the federal government which insists on demonstrated medical competence as a prerequisite for receiving medicare funds. Other professions are feeling the pressure too, whether from outside sources or as a result of self-perceived deficiencies. However though an enlightened minority among professionals are recognizing their obsolescence there is still a larger job to be done on educating professionals to recognize the need for continuing self-education.

I must say before I go any further, that we who are working on the problem of obsolescence admit to being subject to the same aging process. So when I speak of this process, I include myself in it.

First, I want to indicate something of the dimension of professional obsolescence which happens to be a comparatively modern phenomenon. Then I want to point out some of the basic factors that are inherent in the obsolescence process. Understanding of these is essential to an assualt on the problem. Then finally I will give you some examples of how professional organizations are coping with their effort to update their members.

A phrase which is useful in expressing the extent of obsolescence in various professions is half-life, a term taken from nuclear physics. The half-life of a professional's competence is the point in time after completion of training when he has become roughly half as competent as he was upon graduation. Dr. Edward C. Rosenow, Jr. (1971), vice-president

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of the American College of Physicians, recently estimated the half-life of the knowledge of the medical internist to be five years. Professor J. Lukasiewicz (1971) of Carlton University estimated that while the half-life of a 1940 engineering graduate's knowledge was 12 years, it has shrunk to 5 years for today's graduate. Dr. Robert J. Glaser (1972), vice-president of the Commonwealth Fund in New York and former dean at Stanford Medical School, recently put the half-life or decay rate of medical deans to be an average of three years. Rosenstein (1968) analyzing the content of an engineering curriculum, found that half-life of an engineering course is about five years.

The factor that figures most prominently in hastening professional obsolescence today is the rate of change of factual information and the addition of new data and knowledge. George and Dubin (1971) estimate that in order to keep abreast, a professional must devote 20% of his working time to updating. Forrester (1967) at the Massachusetts Institute of Technology suggested that 25% of a professional's time should be spent in continuous learning and 75% in work. Chapanis (1971) judges that a compulsive, well-versed psychologist would have to read 30 to 40 articles or books every day merely to keep abreast of the current literature. This is obviously an impossible expectation but it does indicate the enormous gravity of the problem. We can't wait till the material buries us.

What Does Obsolescence Mean?

At the present time only descriptive and operational definitions of obsolescence have been advanced. Comparatively little experimental work has been done. One group of investigators has defined obsolescence in terms of a reduction of efficiencies of performance over time. Burack and Patti (1970) found that obsolescence exists when there is a discrepancy between job needs and managerial or professional capabilities as a result of innovation, or when the knowledge and skills of the manager are not

sufficient to accomplish his job. Mahler (1965) described managerial obsolescence as the failure of the once capable manager to achieve results that are currently expected of him. According to Shumaker (1963) obsolescence is a reduction in technical effectiveness resulting from a lack of knowledge of the new techniques and of entirely new technologies that have developed since the acquisition of an individual's education.

In the field of engineering, obsolescence is used to mean the erosion of applicability of knowledge. Zelikoff (1969) analyzed catalog course offerings for five engineering colleges from 1933 to 1965 at five year intervals. By identifying courses that were dropped and courses that were added, he developed engineering erosion curves for five areas of engineering. Figure 1 shows the potential obsolescence of knowledge in electrical engineering as measured by the number of course additions and deletions in the curriculum. The steeper curve in later years represents the rapid increase in technological advancement. For example, for the class of 1935, the percentage of applicable knowledge is about 5%; for the class of 1960, it is about 55%.

Another approach to the definition of obsolescence has been advanced by Mali (1969) in the form of an obsolescence index (OI):

$$OI = \frac{\text{current knowledge understood by engineers}}{\text{current knowledge in the field}}$$

This equation is based on the rate of change versus time. A high rate of technological obsolescence is related to a high rate of growth. The growth curve expresses the exponential rate of technological obsolescence. Siefert (1964) defined obsolescence for engineers as the measurement at some point in time of the difference between the knowledge and skills possessed by a new graduate of modern engineering curriculum and the knowledge and skills actually possessed by the practicing engineer who may have completed his formal education a number of years ago. Ferdinand (1966) described

three types of obsolescence: professional, areal, and ex-officio. In his opinion remedial programs could be more effectively implemented once the type of obsolescence was determined.

It is apparent from the foregoing review of attempts to describe obsolescence that a behavioral definition is still to be developed.

Symptoms and Causes of Obsolescence

The causes of professional obsolescence are many and a number of interacting factors appear to be involved. Several authors have pointed out that certain attitudes, behaviors, and motivational patterns are symptomatic of obsolescence and hence provide guidelines for detecting it. Malmros (1963) has described five signs of obsolescence in engineers and Burack and Patti (1970) pointed out danger signals to managers to which they should be alert.

Harry Levinson (1971) of Harvard prefers to emphasize that professionals are often made obsolete by the organizations in which they work. They are kept obsolete by limited demands and rigid controls which prevent them from enlarging their scope. A man may be required to overspecialize to the point where he operates on a low level of use of his professional knowledge. Or it may be the individual himself who chooses a specialization which is so narrow he becomes unaware of new developments in the rest of his profession. Further, a mutual expectancy between the individual and the organization can create or combat obsolescence. This is what Levinson called "the psychological contract."

Major Areas of Needed Research

Motivation for Professional Updating

One of the toughest problems in combatting professional obsolescence is motivation. A professional person must be highly motivated in order to

maintain competence throughout his career. Dubin and Cohen (1970) have developed a psychological model which describes the motivation to update as a multidimensional process. It comprises both psychological and environmental variables; achievement motivation, supervisory behavior that encourages professional growth, organizational climate that nurtures creativity, challenging work projects that promote on-the-job problem solving, peer and group interaction that stimulates exchange of information, and management policy that rewards updating.

An excellent report was recently published by Renck, Kahn and Gardner (1969) on the motivation of R & D scientists to maintain their scientific competence along with the views of top management on continuing education. In another study Margulies and Rais (1967) interviewed scientists and engineers in advanced R & D technology laboratories. They found that the two activities which best motivated professional growth were on-the-job problem solving (42%) and the interaction with colleagues (20%). At a symposium on professional obsolescence in Cambridge, England (1972), Dill emphasized the importance of personal initiative in coping with obsolescence.

In summary we can say that the motivational process at the adult and professional level is a major undeveloped area and one which continuing education should explore.

Dubin in a recent book on Professional Obsolescence (1971) discusses the magnitude of the problem, especially in engineering and management, and ways of reducing its harmful effects.

Adult Learning

Specialists in continuing education must also recognize the need for systematic study in adult learning processes. There is a 35 year information gap in our understanding of learning by adults--learning which occurs between the ages of 30 and 65. Most learning theory is based on early childhood, or young adults, or populations above the age of 65; comparatively little knowledge has been accumulated from the study of middleaged adults. Yet this period covers the longer span. The area of adult learning is almost virgin territory. In a recent report the Carnegie Commission (1971) has pointed out that much greater attention will be given to the education of adults during the decade of the seventies. It should be very profitable to explore the facets of adult learning and put them into use in continuing education programs.

Measuring Professional Competence

The most common method of assessing competence is by measuring the up-to-dateness of specific knowledge with objective tests. Rosenow (1971) reported the results of a 700 item objective test of medical knowledge. Physicians out of school less than five years scored the highest, those between 5 and 15 scored slightly less than those out five years. As a consequence of this experiment about ten medical societies have initiated self-assessment tests. The anticipated outcome of self-assessment approach in medicine will be to reduce pressures for relicensure and recertification by federal agencies who intend in the very near future to require some indication of competency for participation in health and medicare programs.

The Illinois Medical Society made available at its recent annual meeting (1971) a self-testing program using models, audiovisual material, printed clinical simulation and computerized clinical problems. The

Individual Physician Profile developed at the University of Wisconsin by Dr. S. Silverton (1970) uses a three step process to develop a continuing education program for the physician.

1. Physician's practice profile - data is gathered on patient problems the physician most often treats in his private practice.
2. Written examination - based on the practice profile, an examination is designed to assess the practitioner's knowledge pertaining to his patient's problem.
3. Consultant - utilizing the practice profile and the examination scores, a consultant meets with the faculty member to design an educational program tailored to the practitioner's needs.

The American College of Surgeons (1971) has developed a 750 multiple choice questionnaire to be used for self-evaluation and clinical knowledge of surgery. The Philadelphia County Medical Society (1971) offers a 300 item examination which is used as a self-assessment program of its post-graduate course.

An objective mathematics competence test for industrial engineers was developed at Penn State by Cohen and Dubin (1970). The results showed that the year in which the degree was received made a significant difference on test scores. The more recent the degree, the higher the score. On the average, five out of seventy one questions were missed because the information was new or respondents had no previous training in these subjects. After the respondents were given the results of the test, 42% of the subjects said that they would take short courses in their weak areas.

Surveys of Educational Needs

Another method of determining continuing education needs is through the self-perceived needs of professionals using questionnaires and interviews.

Studies of this kind have been undertaken at the Pennsylvania State University and elsewhere with the following professional groups: engineers (Dubin and Marlow, 1965a), hospital supervisors (Dubin and Marlow, 1965b), managers (Dubin, Alderman and Marlow, 1967), municipal managers (Dubin, Alderman and Marlow, 1968), natural resource managers and scientists (George and Dubin, 1972), mental health workers (Katahn, 1968), and accountants (Roy and MacNeil, 1967), and postdoctoral training needs of industrial psychologists (Lawler, 1967).

The studies on objective and self-perceived needs summarized above are only the beginnings of what can develop into more sophisticated approaches to the complex problem of determining knowledge deficiencies and assessing professional competence.

Education Technology

Education technology offers wider opportunities for professionals to learn through self-instruction and independent study. However, use of educational technology at the professional level requires an understanding of the learning and information seeking process of the user. Two continuing education learning models for physicians, a categorical content model and process model,have been described by Miller (1967). He did not advocate the categorical model because it is built around teaching specific subject matter such as cardiology or physiology. The assumption underlying this model is that practitioners who take these courses will transform their knowledge into action. Miller pointed out that such transformation does not necessarily occur. "Yet we talk of bringing more information to the practitioner or of bringing it to him at his hospital or his office or his home, of making the communication more appealing and more convenient. We talk of better informational sources of primary publication and abstracts and bibliographies." In Miller's opinion "the educational technology industry has done a great deal to improve information processing and transmission,

but it knows very little about the human receiver of that information. The human receiver, the man who must learn and recall information transmitted by this sophisticated new equipment, remains largely untouched."

The process model, on the other hand, requires the learner to identify problems and seek ways to solve them. It is based on the assumption that men learn what they want to learn. Continuing education means self-education, not continuing instruction. If this desirable goal is to be accomplished, there must be a movement away from the content model which encourages dependence on teachers, to a process model, which demands a significant measure of self-reliance--a shift away from the preoccupation with courses and methods towards an augmented concern for educational diagnosis and individualized therapy.

Counseling Adults

I have recently contacted a number of directors of continuing education. The area most frequently mentioned by them as needed in their departments was counseling of adults. Floyd Fischer of Penn State University has stated that "one of the strongest emergent actions across the country is the development of trained counselors for adult students who can give advice on educational and career goals." L. W. Shram of the University of Washington describes adult counseling as far more complex than undergraduate counseling because of the vastly greater variety of experiences, interests, and needs represented by that group. R. W. Wilson of the University of Michigan, states that adult education is either new learning or relearning and frequently involves an almost therapeutic process. Further he comments that adult educational problems must be resolved through counseling and cannot be done through "administration, organization or planning, the basic three components to which adult educators unfortunately seem to devote most of their thinking and training."

Midcareer Change

Continuing education departments are also assuming some of the responsibility for retraining and reeducating individuals who want to change occupations in their middle years. This is an increasing occurrence among industrial, civil, and military personnel who retire early with many work years ahead of them. Hiestand (1971) noted that a significant number of successful men and women have made career changes. These people tend to be dynamic individuals actively searching for new interests which they have not previously considered as career possibilities. What is needed is assistance in helping persons make career changes by helping them to define their goals, ascertain their capabilities, and explore their motivations as a basis for realistic career decision making.

Periodic Readmission of Professional Persons for Postgraduate Training

In a report (1964), On the Utililization of Scientific and Engineering Manpower, an official committee recommended that highly trained persons must undergo continuous self-renewal if they are to maintain their career potential. At the time the Hershey Medical School in Pennsylvania was established, Professor Carpenter formerly of Penn State University, suggested that graduates be permitted to return at regular periods for updating purposes under a conveniently prearranged financial agreement. Bentley Glass (1970a) suggested that a month of every year or three months every third year might be an acceptable pattern for reeducation. Robert Perloff of the University of Pittsburgh (1971) has proposed that graduate training be relocated out of the university, "on location," so to speak, in industry government, and nonuniversity research and service environments where most of the recipients of this training would find their ultimate professional employment.

Koleda (1972) asks the question "are we equipped to view education as something that is available to a person throughout his lifetime and not something he must do between 18 and 22? Certainly several social and economic trends indicate that sooner rather than later we will make such a committment." He concludes by stating "most importantly, a national committment to continuing education and training that will bring educational opportunities, training, and upgraded opportunities, and career-switching options for millions of American workers as a matter of course would be a major step in the direction of providing the kinds of environment in which lifelong usefulness would be all but assured."

Research and Evaluation

Research in continuing education is embarasssingly light both in quantity and quality. The Department of Planning Studies, Continuing Education, the Pennsylvania State University, is one of the few existing units within the continuing education department primarily engaged in survey, evaluation, and motivational research on continuing education problems. The National University Extension Association survey (1971) indicated that 8 out of 10 institutions have less than the equivilant of one full time employee engaged in some kind of research. Webster (1971) at the Institute of National Mental Health identified the following continuing education priorities: learning, adult development, communications, and organizational behavior. He further points out that significant research work is needed in studying high priority areas such as urban development, population explosion, alcohol and drug abuse, delinquency, violence, and the improved delivery of human services.

The absence of research and evaluation in continuing education departments across the country is painfully evident. With rising priorities toward adult education, updating, external degree programs, adult motivation and the like, continuing education departments should consider the employment of professional personnel to assist in doing this job for them.

Updating Within the Professions

I'm sure that many of you are well informed about the status of continuing educational developments in various professions. However, you may be interested in learning of some specific cases which I will report.

Medicine

In reviewing the material on medicine we see an array of ingenious continuing education approaches ranging from peer review evaluation, programmed texts, self-assessment programs, individual physician profiles used as a basis for tailoring individual educational programs, sabbatical leaves, dial access services, clinical scholar programs, use of retired faculty as consultants, interlibrary cooperation, etc. There is no doubt that medicine is assuming a leading role in continuing education.

In 1970 the American Medical Association conducted a survey of state medical societies to determine their programs and policies relating to continuing medical education. The findings are: (a) 38 state societies reported having organized units responsible for continuing education programs, (b) 15 state societies reported having a policy of basic principles concerning continuing medical education, (c) 14 state societies had carried out studies or surveys on continuing education, (d) 10 state societies responded to the question on continuing education as a requirement for society membership, (e) in 7 state medical associations a continuing education requirement has been proposed but not adopted, (f) 3 state societies have adopted continuing education as a requirement for membership.

The medical profession has made approaches to the monitoring of competency of the members. Periodic recertification is being considered by members of medical specialty boards. For example the long-range com-

mittee of the American Board of Internal Medicine has accepted the recommendation that periodic recertification of its diplomates should be undertaken. They acknowledge that competence is a perishable commodity and plan to administer examinations dealing with significant new knowledge in internal medicine and subspecialties at 10 year intervals (Hickham, 1970). The National Board of Medical Examiners is developing new approaches to measure clinical competency. Dr. John Senior of the National Board described three components that have proposed to evaluate a physician: (a) knowledge of his field of practice, health, and disease; (b) performance - his actual behavior and results obtained in practice; and (c) competence to solve clinical problems. Dr. Senior is experimenting with computerized problems to probe the physician's ability to use his knowledge, acquire more information, and put it all together to diagnose the problem, and to use judgement in making decisions about how to manage the patient.

At least two state medical societies have required their members to take a stipulated number of hours of continuing education every three years. As evidence of the intention to maintain continuing education standards, the Oregon Medical Association recently suspended 11 members from the association who failed to keep up with educational requirements. The newly established American Board of Family Practice requires recertification every six years. The president's commission on health manpower recommended relicensure to compel physicians to keep up with new knowledge.

Dr. Clement R. Brown (1970) writing in the Journal of the American Medical Association believes that "mandatory attendance at current 'cure all' programs for undefined ills could be a disaster and would frustrate the adventurous efforts of increasing the number of educators to create innovative approaches to education for the practicing physician." Dr. Brown's "bi-cycle" concept relates patient care directly to learning and

education. He is critical of the standard approach to medical education, such as attending courses,because this method does not utilize the best learning methods. The "bi-cycle" concept, on the other hand, is based on the following learning principles: the needs of the learner are demonstrated, learners are actively involved in setting up criteria for their own performance, problem solving experiences and information transfer are emphasized, conferences and examination are based on their own practice and cases,and finally immediate feedback is provided to each examinee.

The MIST program--medical information service via telephone--was developed at the Alabama Regional Medical Program. By the use of a telephone system, immediate person to person consultation is available on a twenty-four hour a day basis.

Natural Resource Managers and Scientists

At the Pennsylvania State University, Professor John George and I have this year completed a survey on over 5500 natural resource managers and scientists to determine the specific self-perceived educational needs of persons actually engaged in the management of natural resources. These personnel were provided with a list of more than 50 specific areas of knowledge, chosen from a review of current literature and from discussions with university, state, federal, and industrial personnel. The respondents indicated the degree of their personal needs.

More than 75-85% indicated that they "should have or could use" more training in:

Environmental management

Pollution and Environmental Quality

Ecosystems

Pollution Biology

Promoting Community Interest in Natural Resources

Long-range Planning

Interrelationship of Natural Resource scientists, social scientist and planner

Some of the principles conclusions were:

1. Merely to keep abreast, natural resource managers should spend one day a week or the equilivant in regularly scheduled study or training.
2. Regional centers should be established to provide an efficient means of keeping resource managers abreast of current developments.
3. Immediate efforts should be made to increase the number of persons engaged in resource management and to encourage minority and disadvantaged persons to seek careers in this field.

Education

Two of the best examples of coping with teacher obsolescence come from Japan and Great Britain. Teacher updating in Japan was described by Glass (1970b) after he visited six Japanese Science Education Centers. These centers were first established in 1960 to remedy the poor training and reduce the educational obsolescence of the science teachers in the schools, By 1965 the results were so extraordinary that 33 centers had been built and the scope of the centers had been broadened to include mathematics, social studies, languages and other disciplines. Bailey (1971) described teacher's centers in Great Britain where self-improvement programs are organized and run by teachers themselves for purposes of upgrading educational performance. Their primary function was to make possible a review of existing curricula and other educational practices by groups of teachers and to encourage teacher attempts to bring about changes.

The Educational Testing Service at Princeton has initiated a series of programs in continuing education for practicing educators to keep them up to date on assessment, evaluation and educational information systems.

The focus of the 3-5 day institutes will be on understanding key concepts in evaluation and on developing problem-solving skills.

Mr. Alan Pifer, president of the Carnegie Foundation, in his 1971 annual report in the Responsibility of Reform in Higher Education presents a number of suggestions that might be taken to lighten the load on higher education. Some of his suggestions were: to reduce undergraduate education to three years and transfer some university research functions to independent institutes or to government. Another suggestion is to cull out of higher education an extensive array of vocational courses. This would require a network of new institutions for further education with their programs tied on a sandwich basis to a variety of manufacturing and service industries.

The Report of the Special Commission on the Social Sciences of the National Science Board (1969) of the National Science Foundation urged that "steps be taken to increase the amount of Social Science content in formal continuing education programs in this country and that more special seminars and conference programs which bring together community leaders and social sciences be instituted.

Psychology

A survey of the American Association of State Psychology Boards by Lewinsohn and Pearlman (1971) showed that a sizable number of Psychology State Boards have begun to discuss continuing education but none have taken action. Most boards felt that the present existing opportunities for continuing education are very insufficient.

Ellsworth surveyed 160 certified psychologists in Oregon on a proposal that keeping up-to-date be made a requirement for certification renewal. Of the 133 responses, 29% supported the proposal that continuing education be required as a basis for certification renewal. Twenty-seven percent gave

positive support, and 43% took a negative point of view. Those who took a negative point of view were opposed because of the coersive and potentially punitive requirements. In New York State, psychologists who are reimbursed for their diagnostic and therapeutic services under medicaid are required to submit triannual reports of acceptable continuing education experiences.

In Nashville, Tennessee, a center for the advanced study and continuing education in mental health has been established by Katahn (1968). The center is a confederation of educational institutions for the purpose of developing interdisciplinary continuing education mental health programs among a number of universities in the southeastern states.

At a symposium on Motivation for Professional Updating organized by the author at the XVII International Congress of Applied Psychology in Liege, Belgium last year, Porter (1971) discussed the motivational determinants for professional updating using expectancy theory. At the same symposium, Hinrichs (1971) of IBM compared two motivational models--the Maslow need hierarchy and the expectancy model--to the problem of skills updating in a large technology based organization. Professor Perloff (1971) of the University of Pittsburgh discussed why obsolescence occurs, ways of detecting obsolescence, and means of coping with obsolescence. Professor Levinson (1971) of Harvard University in his critique commented that some people are made obsolete by the organization in which they work and are kept obsolete by the limited demands and rigid controls of the organization which prevents them from enlarging their scope.

Law

Continuing legal education is increasing because of two factors: law schools are in transition because of the introduction of courses and clinical work into the basic law school curriculum, and law schools have a growing awareness that the quality of continuing legal education should

be commensurate with the quality of legal education.

The joint committee on Continuing and Legal Education of the American Law Institute and the American Bar Association recently listed 345 courses in 33 different jurisdictions. Oral type programs are favored by many lawyers as a mode of continuing their education. As a result, cassette-type plastic tapes for portable machines are most frequently used in this program.

Biological Science

Stein (1970) at the American Institute of Biological Science, describes a course that has been developed for biology department chairman. It covers such topics as budgeting, comparative data on teaching loads, instructional costs, salaries, faculty loads, contract negotiations, etc. The participants, especially inexperienced chairmen, expressed much enthusiasm for such a course. I could find no evidence that the professional biological societies were offering continuing education programs.

Chemistry

The American Chemical Society (1971) offers short courses geared primarily to the chemistry graduate who has not been able to keep abreast of the literature and now finds that entirely new disciplines have emerged. Since the inception of courses in 1965, enrollments have doubled; from 1,420 in 1965 to 2,900 in 1970.

Operations Interface (1971) represents a growing trend in the chemical industry to improve industry-academic relationships. Its prime purpose is to increase understanding and cooperation between chemical companies and chemistry departments. Interface activities are becoming centered on seminars and discussion sessions where participants talk on their common problems, such as unemployment, pollution, and environment.

Dentistry

Hozid (1969) discusses the role of continuing education in dental obsolescence. He points out that in the health profession, education is up-to-date for only five years after the time the professional has completed his formal training. Surveys in dentistry have indicated that only 20% of all dentists in the United States attend any form of continuing education program in any given year. He cites a New York State Health Department ruling that dentists to be eligible for participation in the medicaid program, dentists must be active in continuing education. Hozid stresses that a contributing factor to obsolescence has been an undue emphasis on the individual practitioner. This emphasis has been reinforced by a series of four myths that have relegated continuing education solely to the realm of the practitioner.

The first of these myths is a definitional one--refresher course. "This inadequate definition of continuing education as refresher courses has impeded dental practitioners, professional organizations, and educators engaged in trying to stem the tide of obsolescence. The term connotes a nonsystematic, potpourri approach, and the entrenched concepts underestimate the complexities involved in keeping up-to-date." The second myth deals with individual responsibility. This myth states that keeping current is the onus of the practitioner and he is chastized if he is not fulfilling his responsibilities. The third myth is the status quo myth. This assumes that the profession has remained static. To overcome this he recommends a professional "head start" program for older practitioners. The fourth myth deals with the solitary student. Individual information gathering is obsolete for keeping up-to-date because the amount of current knowledge is too massive.

He concludes by stating that "the usual continuing education programs

are themselves obsolete and that this obsolescence is a significant causal factor supporting practitioner obsolescence." He recommends a strategy to reduce obsolescence by the development of an integrated approach among professional schools, professional organizations, and appropriate government agencies. Such an approach would have a greater potential for changing the system than the current focus on the individual practitioner and his deficiencies.

Organization for Economic Cooperation and Development in Western Europe

Active interest in continuing education exists in Western Europe. In October 1972 the Organization for Economic Cooperation and Development composed mostly of western European nations sponsored a conference on the utilization of highly qualified personnel. The conference was attended by senior policy makers and officials of Western European countries who are responsible for the education and manpower policies in their respective countries. The conference recommended:

1. Expansion and stimulation of incareer education programs in member OECD countries,especially in the professional and vocational fields.
2. Improvement of personnel management practices in industrial and governmental agencies.
3. Preparing personnel management specialists to be able to counsel highly qualified persons in their career development.
4. Coordination of governmental, labor, and industry organizations dealing with problems of continuing education.
5. Developing of a system of recurrent education whereby educational opportunities would become available throughout the working life of a person.

Management

At two major organizations, the Sandia Laboratories in New Mexico

(Lassiter, 1971) and Picatinny Arsenal in New Jersey, experimentation is going on in continuing professional education. Both of these organizations are developing models with the following characteristics.

1. Each individual in the organization develops a career plan for a five year period and specifies his educational needs for the next 2,3,4, and 5 years.
2. These educational activities are matched against the organizational requirements for the next 2,3,4, and 5 years. These are developed by supervisory personnel.

In both organizations, the educational program is worked out jointly between the individual and his supervisor.

A unique feature of the Picatinny Arsenal program is that educational and costs information is programmed into a computer. On a quarterly basis each department receives a readout on the extent of participation and cost.

At the Sandia Corporation some testing of the model has taken place. The difficulties encountered are that supervisors were reluctant to outline their long-range needs and top management had not given full approval of the project.

Professor Gerald Barrett (1971) in a symposium on Professional Obsolescence, explored the future needs of R & D personnel. He concluded that the skills and knowledge required of future professionals will be different from what is considered sufficient today. A great majority of today's professionals will require continuous training or substantial retraining if they are to survive in a rapidly changing world of work.

At the same symposium, Dean William Dill (1972) discussed obsolescence as a problem of personal initiative. He suggests that greater emphasis be given to developing positive model leaders and senior professionals who demonstrate in visible ways that taking time out to explore, to question,

to learn, and to make mistakes as one learns are approved priority behaviors.

Saline (1972) describes a rationale for education in General Electric Company to assure the current and future adequacy of its professional and managerial work force.

Engineering

Robert O'Neill (1970) of the University of Southern California has summarized the major engineering programs in continuing education now in progress at universities, in industry, federal government, private organizations, and professional societies. He concluded that a concensus of opinion exists that the responsibility for continuing education does not rest with any one of the previous groups; it must be shared and coordinated. Greater commitment and budget must be made by academic institutions, industry, government, and professional societies. The problem of motivation and course credit have been recognized but not solved.

Dean Israel Katz (1971) at Northeastern University in Boston talking about Expanding Horizons in Continuing Engineering Education, identified 14 major areas of continuing education to which engineers can give attention. Some of these areas are (a) utilization of technology to improve environment and resource management, (b) increased emphasis on interpersonal relations since engineers work in team work operations and the effectiveness of engineering effort is achieved through cooperation of people, (c) consideration of national priorities toward which technology may be applied, and (d) greater expansion of legal aspects for engineers. Other areas include career changes; improved counseling for high school and college students; greater interdisciplinary efforts between the engineer and the areas of physical and biological sciences, health care, business; recognition of the importance of motivation; and economic development of the community.

At the Bell System Center for Technical Education, Sener and Kotch (1971) reported that major emphasis in learning is centered on the development of behavioral objectives for each course. Observable changes in the student's behavior must occur as a result of training. In addition a criterion test has been developed for each course to measure whether the student has satisfactorily attained the course objective.

Wallace Wilson, a group vice-president of General Motors has written that engineers who ignore the meaning of technological obsolescence become the victims of complacency. "We can't afford to become technically obsolete, because then we approach problems with outdated viewpoints, theories, and techniques." He believes that the individual must be basically responsible for his own development and updating. However, and this is a new twist in my opinion, the employer has an equal responsibility to provide the environment and incentives to encourage the engineer to broaden his base of knowledge. The employer must show the engineer that there is a premium put on up-to-date education. Wilson further emphasized the importance of communication skills, supervisors skills, and "education by transfer" as a means of broadening engineers' background. Finally he admits that technology has created major sociological problems and the engineer must understand these sociological changes.

Dalton and Thompson's study (1971) of 2,500 design and development engineers points out that the engineer's performance peaks in his middle to late 30's, as measured by supervisory performance appraisal. The study identifies a trend toward earlier obsolescence; the years of an engineer's high performance are starting and ending sooner. The movement toward obsolescence is occurring at an earlier age when larger numbers of technically trained men are entering their 40's and 50's. This early obsolescence is due to rigid company performance appraisal systems, inequitable job assignments, and insensitivity to the needs of older engineers.

These practices must be changed. The authors offer suggestions for making changes and discuss some new approaches such as classes by cable television, sabbatical leaves for employees, and portable pension plans.

Landis' study (1971) of 1146 engineers in 12 companies pointed out that continuing education is hampered by the attitude of the immediate supervisor, by the absence of an easily identifiable pay-out function, by haphazard regional planning, and by anti-intellectual attitudes that persist in many organizations. The immediate supervisor plays a crucial role in encouraging and accommodating his men.

Dean W. Ryland Hill of the University of Washington (1971) describes a program developed for the engineers who have been in industry for 10 or more years and who sense that the technical world is passing them by. These engineers were experiencing diffuculty in reading the literature and in understanding younger engineering graduates.

The foregoing examples represent different attempts at coping with continuing education in the professions. But you are the professional educators. It may be well to stress here at the end that it is the members of this organization who are the major educators of adults beyond the formal years of college and professional training. You are the logical agents or catalysts to whom the professional practitioners should be able to turn for help in combating obsolescence. Professionals realize that they need recycling. It is your responsibility to undertake the necessary studies which can lead the way to the achievement of the goals of continuing education.

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